sub-zero®
INDIA
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COLD ROOM CONTROLLER

USER MANUAL

sub-zero®

CRC 1100A

Index

Index

Operation

When operating in the field of refrigeration, temperature controls is performed with a positive differential. The compressor stops when the Setpoint temperature is reached and restarts when the temperature reaches setpoint plus the differential.

Two different defrost types can be selected : electrical (the compressor is stopped) or at cycle inversion (warm gas; the compressor keeps working). It is also possible to select the interval between defrosts (and the interval count type) and a maximum time (time-out) after which defrost is interrupted. The same probe which controls the defrost cycle is used to control the evaporator fans. It is possible to set the temperature, the delay time after a defrost and the relation of fans with the compressor.

A series of “safety controls” (delay at start-up, minimum disable time, minimum time between activation) protects the compressors from close starts. In case of probe error or temperature alarm, the instrument signals the event through acoustic signal and by closing the relay contact. By pressing the mute key, the buzzer is silenced and the relay contact is opened. The functions can be easily customised by setting some programming parameters. Other parameters allow to suit the instrument to various applications.

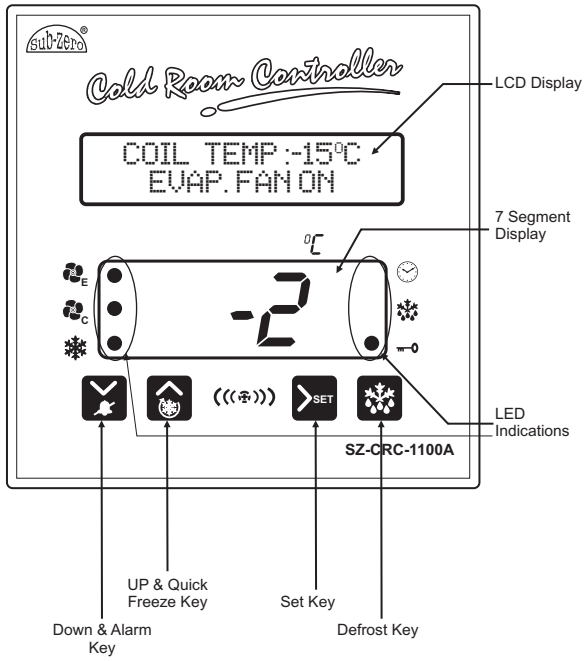
Subzero Cold Room Controller CRC-1100A

Introduction

Features :

- **LCD with backlighting & 7 segment display to display all parameters.**
- **2 NTC probes for cold room temp + evap. coil temperature.**
- **Range: -50°C to + 50°C (1°C res.)**
- **Relay outputs : Compressor + Heater + Evap. Fan + Cond. Fan + Alarm.**
- **Audible alarm.**
- **Digital inputs : 2nos (a) Door Switch (b) Pressure cutout.**
- **HP/LP/OSS trip protection for compressor.**
- **Compressor protection algorithm.**
- **Auto/Man defrosting facility (Time/Temp based).**
- **Special Software to indicate probable heater fault.**

Get to Know Your Controller



Items included

NO.	ITEMS	QTY
1.	MOUNTING CLAMP	2
2.	CATALOG	1
3.	NTC SENSOR 1.5 METER	2
4.	3 X 20 SCREW	2

Key Introduction

	**Defrost Key :** To force a manual defrost, press defrost key for 4 seconds. The unit will go into defrost mode. If E4 parameter is set to 0, or coil temp. is greater than defrost stop temp. (E5) this key remain inactive.
	**Mute Key :** This key will mute the buzzer and reset the alarm relay, Down key .
	**Quick Freeze :** This key used to put controller in quick freeze mode. To activate this mode press QF key for 4 seconds. The compressor operates in this mode for time duration set through quick freeze time duration (Ct) parameter and set pint through Quick freeze set point (CS) parameter, UP key.
	**Set Key**

Sr. No.	Parameter	Parameter setting method	Range		
			Min	Max	Fac Set
1	Set point	Function : To set the cutout point of the controller.	(CS+1)°C	(P2-1)°C	0°C
	Press and hold set key for 4 seconds and release.	Display will change to set value and set value will flash on display. The set point value can now be changed by using UP/DOWN key. After setting the desired value, press the set key and you will see "- - -" which confirms that the set point has been stored in memory. P2 = Max allowable high temp. limit. CS = Quick Freeze Set Point.			
2	To Set other parameter				
	Hold UP and DOWN keys simultaneously for 4seconds.	Display will show P2 and will flash. To go to other parameters, use up/down keys.			
3	PROGRAMMING MODE HIGH SET ALARM P2 Parameter	Function : To set maximum allowable high temperature limit.	(SP+1)°C	50°C	50°C
	To change the P2 parameter, press the set key.	Use UP/DOWN key to set desired value. Ones set at a particular value, this will not allow the set point to go above this value and below Quick Freeze Set Point (CS). **Example :** Setting this parameter at -25°C will not allow the set point to go above -25°C. Also, if the temperature reaches -25°C , the display will show Ht (High temp) indicating that temperature has gone above the value in this parameter and at this point the alarm relay and buzzer will come on.			

4	PROGRAMMING MODE LOW SET ALARM P3 Parameter	Function : To set minimum allowable low temperature limit.	-50°C	(CS-1)°C	-50°C
	To change the P3 parameter, press the set key.	Use UP/DOWN key to set desired value. Ones set at a particular value, this will not allow the CS (QF Set Point) to go below this value. **Example :** Setting this parameter at -30°C will not allow the CS point to go below -30°C. Also, if the temperature reaches -30°C , the display will show Lt (Low temp) indicating that temperature has gone below the value in this parameter and at this point the alarm relay and buzzer will come on.			
5	PROGRAMMING MODE ROOM PROBE DIFF. P4 Parameter	Function : To set the comp. differential (hysteresis).	1°C	20°C	2°C
	To change the P4 parameter, press the SET key.	Use UP/DOWN key to set desired value. Differential between cutout and cutin temperature can be set between 1°C to 20 °C. **Example :** If the set point is set at 10°C and differential is set at 2°C, then when the system reaches 10°C, the comp. Relay will cutout. Since the differential is 2°C, the comp. Relay will cutin at 12°C (10°C + 2°C).			
6	PROGRAMMING MODE ROOM PROBE CALIB P5 Parameter	Function : To set room probe offset calibration.	-10°C	10°C	0°C
	To change the P5 parameter, press the SET key.	Use UP/DOWN key to set desired value. In time it may be possible that the temp. on display may be offset by a degree or so. To compensate for this error, you may need to add or minus the degrees required to achieve the correct temperature. **Example :** The temperature on the display is 28°C, whereas the actual temperature is 30°C. You will need to set this parameter to 2°C, which means that once out of programming mode, the temperature will show 30°C(28°C + 2°C).			

7	PROGRAMMING MODE COMP. TIME DELAY P6 Parameter	Function : To set time delay between comp. relay restart time.	0Min	30MIn	3Min
	To change the P6 parameter, press the SET key.	Use UP/DOWN key to set desired value. This parameter is used to protect the compressor from restarting in a short period of time. It can be set between 0 to 30Min. **Example :** If this parameter set at 3 minutes, the relay will cutoff at set temperature, but will not restart for a minimum of 3 minutes, even if the differential is achieved earlier. This parameter is good to protect the life of the compressor or even in applications where the probe is placed at places where there are sudden and short changes in temperature like above a cold room door.			
8	PROGRAMMING MODE DRIP TIME P7 Parameter	Function : To set drip time for defrost water to drain out.	0Min	20MIn	1Min
	To change the P7 parameter, press the SET key.	Use UP/DOWN key to set desired value. This is time for which the Fan, Compressor, Condenser, Heater will stay OFF so that the defrost water can drip and drain out. It can be set between 0 to 20Min.			
9	PROGRAMMING MODE COMP IN PRB FAIL P8 Parameter	Function : To set comp. Relay status on room probe failure.	0	2	1
	To change the P8 parameter, press the SET key.	Use UP/DOWN key to set desired value. 0 = Compressor relay ON. 1 = Compressor relay performs a duty cycle of 'on' minutes and 'oF' minutes(see next two parameter). (see Sr. 9A and 9B) 2 = Compressor relay OFF.			
9A	PROGRAMMING MODE CYC. ON TIME ON Time Parameter	Function : If P8=1 Cyclic ON time .	2Min	60Min	10Min
	To change the On time parameter, press the SET key.	Use UP/DOWN key to set desired value. This is cyclic ON time of Comp relay. **This parameter will be active only when P8 = 1.**			

9B	PROGRAMMING MODE CYC. OFF TIME OFF Time Parameter	Function : If P8=1 Cyclic OFF time .	3Min	20Min	4Min
	To change the Off time parameter, press the SET key.	Use UP/DOWN key to set desired value. This is cyclic OFF time of Comp relay. **This parameter will be active only when P8 = 1.**			
10	PROGRAMMING MODE DOOR ALARM DLY P9 Parameter	Function : To set door open alarm delay.	0Min	30MIn	10Min
	To change the P9 parameter, press the SET key.	Use UP/DOWN key to set desired value. **Example :** If P9 = 10 minutes, alarm for door open fault will be generated if door open fault present for 10 minutes.			
11	PROGRAMMING MODE FAN STOP TEMP. L1 parameter	Function : Evap. Fan stop coil temp.	-50°C	50°C	2°C
	To change the L1 parameter, press the SET key.	Use UP/DOWN key to set desired value. This setting is used to limit maximum temperature beyond which the evap. fan will cutoff			
12	PROGRAMMING MODE FAN TIME DELAY L2 Parameter	Function : To set time delay between evap. fan relay restart time.	0Min	99Min	1Min
	To change the L2 parameter, press the SET key.	Use UP/DOWN key to set desired value. **Example :** If this is set 3 minutes, the evap. fan relay will cutoff at the temp. set by L1 parameter(Fan stop temp.) but the fan will not come on for a minimum of 3 minutes if L4 is achieved earlier.			
13	PROGRAMMING MODE FAN IF COMP OFF L3 Parameter	Function : Evap. Fan operation when compressor is off.	0	1	1
	To change the L3 parameter, press the SET key.	Use UP/DOWN key to set desired value. 0 = Evap. fan OFF when compressor is OFF. 1 = Evap. fan will be stay ON when compressor will be off. **Example :** If this parameter is set to 1, then when comp. OFF, evap. fan will remain ON.			

14	PROGRAMMING MODE COIL PROBE DIFF. L4 Parameter	Function : Evap. fan differential (hysteresis).	1°C	20°C	2°C
	To change the L4 parameter, press the SET key.	Use UP/DOWN key to set desired value. **Example :** If L1 parameter(Evap. fan stop temp.) is set to 2°C, and the L4 is set to 2°C, then evap. fan will cut off at 2°C and restart only at 0°C.			
15	PROGRAMMING MODE COIL PROBE CALIB L5 Parameter	Function: To set coil probe offset calibration (evap. fan coil probe).	-10°C	10°C	0°C
	To change the L5 parameter, press the SET key.	Use UP/DOWN key to set desired value. In time it may be possible that the temp. on LCD display may be offset by a degree or so. To compensate for this error, you may need to add or minus the degrees required to achieve the correct temperature. **Example :** The temperature on the LCD is 28°C, whereas the actual temperature is 30°C. You will need to set this parameter to 2°C, which means that once out of programming mode, the temperature will show 30°C (28°C + 2°C).			
16	PROGRAMMING MODE FAN WHEN DEFROST L6 Parameter	Function : Evap. fan status during defrost.	0	1	1
	To change the L6 parameter, press the set key.	Use UP/DOWN key to set desired value. 1 = Evap. Fan will stay OFF during defrost. 0 = Evap. fan will stay ON during defrost.			
17	PROGRAMMING MODE FAN WITH DOOR L7 parameter	Function : Evap. fan status on door open.	0	1	0
	To change the L7 parameter, press the SET key.	Use UP/DOWN key to set desired value. This parameter controls the evap. fan on/off status depending on the digital input (Door input). 0 = Evap. Fan will stay ON door fault. 1 = Evap. fan will turn stay OFF with door fault.			

18	PROGRAMMING MODE COND START DELAY d1 Parameter	Function : To set Condenser delay to start before comp.	0sec	30sec	10sec
	To change the d1 time parameter, press the SET key.	Use UP/DOWN key to set desired value. **Example :** If this parameter set to 10 sec and P6 = 3 min. then condenser will turn ON 10 seconds before compressor.			
19	PROGRAMMING MODE COND WHEN DEF. d2 Parameter	Function : To set Condenser relay status during Hot gas defrost.	0	1	0
	To change the d2 time parameter, press the SET key.	Use UP/DOWN key to set desired value. 0 = Condenser will be OFF during Hot gas defrost. 1 = Condenser will be ON during Hot gas defrost.			
20	PROGRAMMING MODE QUICK FREEZE SP CS Parameter	Function : To set quick freeze set point.	P3+1°C	SP-1°C	-5°C
	To change the CS parameter, press the SET key.	Use UP/DOWN key to set desired value. **Example :** If this is set to -5°C, and quick freeze time duration is set to 1 hr, then when it is set to quick freeze mode, the compressor will take -5°C set point for 1 hr.			
21	PROGRAMMING MODE QUICK FREEZE DUR Ct Parameter	Function : To set Quick Freeze time duration.	0Hrs	30Hrs	0Hrs
	To change the Ct parameter, press the SET key.	Use UP/DOWN key to set desired value. This is maximum amount of time allowed for Quick Freeze. If set to 0, there will be no quick freeze. **Example :** See CS parameter.			
22	PROGRAMMING MODE POWER ON DEFROST E0 Parameter	Function : To set / activate power up defrost cycle.	0	3	0
	To change the E0 parameter, press the SET key.	Use UP/DOWN key to set desired value. This parameter will decide to start power up defrost or not. 0= No power up defrost. 1= Power up defrost after 1 Hr. 2= Power up defrost after 2 Hr. 3= Power up defrost after 3 Hr. **Example :** This parameter will help to achieve first defrost			

		cycle in short amount of time after power on. If E3 < E0 then power up defrost cycle will be ignore as frequency defrost cycle achieved before power up defrost cycle.			
23	PROGRAMMING MODE TYPE OF DEFROST E1 Parameter	Function : To set type of defrost	0	2	0
	To change the E1 parameter, press the SET key.	Use UP/DOWN key to set desired value. 0 = Heater defrost in which case compressor off, heater on. 1 = Hot gas defrost where compressor on, heater on. 2 = Time based defrost, independent of evap coil probe temperature. Works with E4 time duration. Comp. Condenser, Heater will be off during this type of defrost.			
24	PROGRAMMING MODE DEF. TIME CALC. E2 Parameter	Function : To set type of computation for defrost frequency.	0	1	0
	To change the E2 parameter, press the SET key.	Use UP/DOWN key to set desired value. 0 = Total of real time. This means that the time calculation for defrost frequency will be for the total hours the unit has been running. 1 = Sum of total compressor operating times. This means that for time calculation, the unit will add the total time the compressor has been in an ON mode. CRC-1100-A keeps a records of the number of hours worked +/- ½ hour, incase of a power failure. **Example :** If E3 is set to 6 hrs and 3:40 hrs have passed after unit has started and power fails, then defrost cycle will start after 3:30 hours when power resumes.			
25	PROGRAMMING MODE DEF. FREQUENCY E3 Parameter	Function : To set Defrost frequency.	1Hrs	31Hrs	6Hrs
	To change the E3 parameter, press the SET key.	Use UP/DOWN key to set desired value. This is the amount of time between two defrost cycles.			
26	PROGRAMMING MODE MAX. DEF. DURATION E4 Parameter	Function : To set Maximum defrost duration	0Min	99Min	30Min

	To change the E4 parameter, press the SET key.	Use UP/DOWN key to set desired value. This is the maximum amount of time allowed for a defrost. **If set to 0, there will be no defrost cycle.**			
27	PROGRAMMING MODE MAX. DEF. TEMP E5 Parameter	Function : Defrost stop temperature (Evap. coil probe).	-50°C	50°C	8°C
	To change the E5 parameter, press the SET key.	Use UP/DOWN key to set desired value. This is the maximum temperature allowable at which the defrost process will stop. **Example** : If this parameter is set to 7°C, then if defrosting is in progress then when E5 temperature reaches 7°C, the defrost process will stop.			
28	PROGRAMMING MODE HEATER CHK. FUNC E6 Parameter	Function : Alarm to check Heater function.	0	1	0
	To change the E6 parameter, press the SET key.	Use UP/DOWN key to set desired value. 0 = No buzzer or indication. 1 = Buzzer will come on incase the temperature of the coil has not risen by 10 C within 50 % of the defrost time.(E4) **Activated when E1 = 0 (Heater defrost).**			
29	PROGRAMMING MODE DISP. DURING DEF E7 Parameter	Function : To set display during defrost.	0	1	0
	To change the E7 parameter, press the SET key.	Use UP/DOWN key to set desired value. 0 = Display will show room temperature. 1 = display will show ' dF' during defrost.			
30	PROGRAMMING MODE PROB. FAIL DEF. DUR E8 Parameter	Function : To set maximum defrost duration on coil probe fail.	1Min	10Min	5Min
	To change the E8 parameter, press the SET key.	Use UP/DOWN key to set desired value. This is the maximum amount of time allowed for a defrost during coil probe fail. **Example :** If this is set to 5 minutes, then defrost for 5minutes will take place during coil probe fail.			

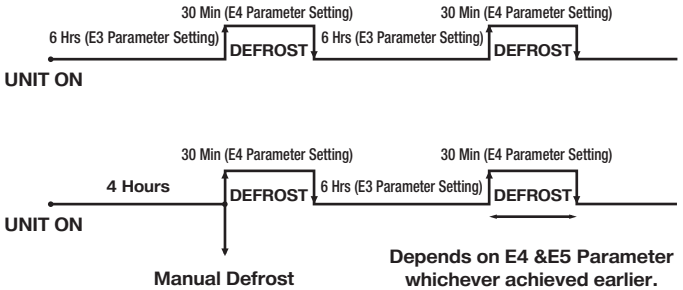
31	PROGRAMMING MODE POWER ON ALM DLY AL Parameter	Function : Power on time delay for Alarm(HT/LT).	0Min	99Min	30Min
	To change the AL parameter, press the SET key.	Use UP/DOWN key to set desired value. **Example :** If you set this parameter to 20min, once the power is switch on, the alarm for Ht/Lt will not activate for 20 minutes after the power is switched on. This is most useful to avoid the nuisance alarms when the ambient are high when machine is switched on after long time.			
32	PROGRAMMING MODE LOCK KEYPAD LP Parameter	Function : To lock keypad.	0	1	0
	To change the LP parameter, press the SET key.	Use UP/DOWN key to set desired value. This parameter can lock the keypad so that tampering is not possible by by-standers. 1 = Activates keypad lock. 0 = De-activates keypad lock. On activation, all the parameters can only be viewed but not modified.			
33	PROGRAMMING MODE RESET PARAMETERS FS Parameter	Function: Revert to factory set parameters.	0	1	0
	To change the FS parameter, press the SET key.	Use UP/DOWN key to set desired value. 1 = Revert to factory set parameters. Useful to debug setting problems. When set to 1, all parameters are programmed to factory set vales.			
39	PROGRAMMING MODE END OF PROG. End Parameter	Function : To end programming.			
	To end programming press the SET key.	Once the set key is pressed,the control goes into the normal mode and displays the temperature and all settings are recorded.			

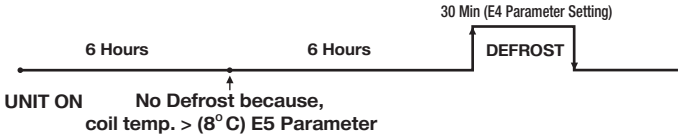
Operating Messages and Icon Status

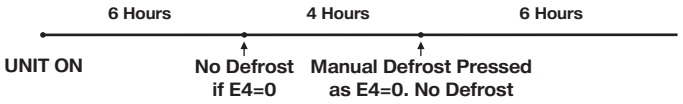
Message	Mode	Description	Parameter
Ht	Toggle	Temperature above the maximum limit of the set point.	P2
Lt	Toggle	Temperature below the minimum limit of the set point. (P3)	P3
PP	On	Probe short circuit, circuit open or without probe, or temperature > 50°C or <-50°C	
	On Off flashing	Comp. Relay On. Comp. Relay Off. Comp. Relay Timedelay.	SP, P4,P6
	On Off	Alarm (Ht, Lt, PP, HP/LP trip, heater fault)	
	On Off	Keypad locked/unlocked.	LP
	On	Defrosting in progress	E3, E4, E5
	On	Drip time On.	P7
	On Off flashing	Evap. Relay On. Evap. Relay Off. Evap. Relay Timedelay.	L1, L4,L2
	On Off flashing	Cond. Relay On. Cond. Relay Off. Cond. Relay Timedelay.	P6, d1
* HP/LP TRIP * OSS		HP/LP/OSS (pressure) has tripped and a signal has been sent through the Digital Input.	
HEATER FAULT		Temp of coil has not risen by 10°C within 50 % of the defrost time.	

Technical Data

Housing : ABS Plastic.
Dimensions : Front - 96 x 96 MM, Depth 110 MM
Panel : 92X92mm.
Mounting : Panel.
Connection : Screw Terminal.
≤ 2.5sq mm one wire/ terminal only.
Display : 2X14.2mm (0.56") LED + LCD.
Data Storage : Non-Volatile EEPROM Memory.
Power Input : 230 V, 50 HZ / 60 HZ AC,Others on request.
Operating Temp : 5°C to 50°C (non-condensing)
Storage temp : -20°C to 70°C (non-condensing).
Output :
Cond. Fan Relay : 8(3)A/250Vac.
Other Relay : 8(2)A/250Vac.
Alarm Relay : 5A/250Vac.
Input : 2 NTC Probe.
Resolution : 1°C
Accuracy : +/-1°C
Range : -50°C to +50°C

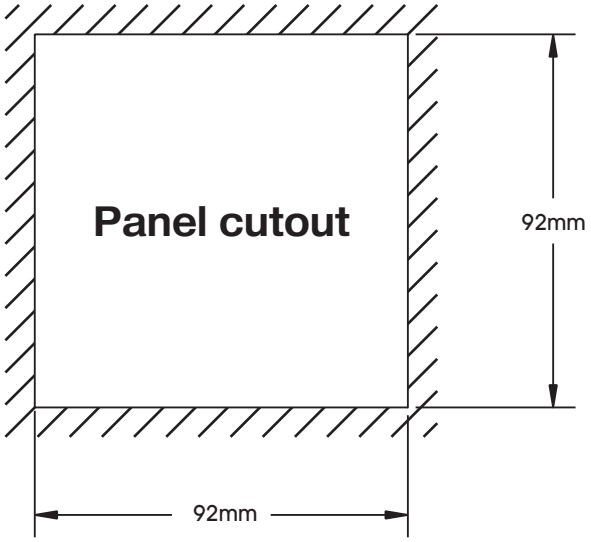


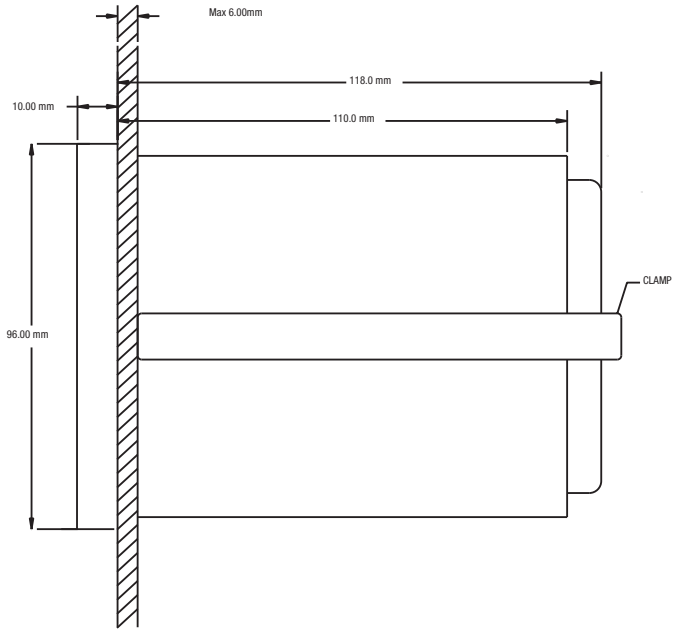


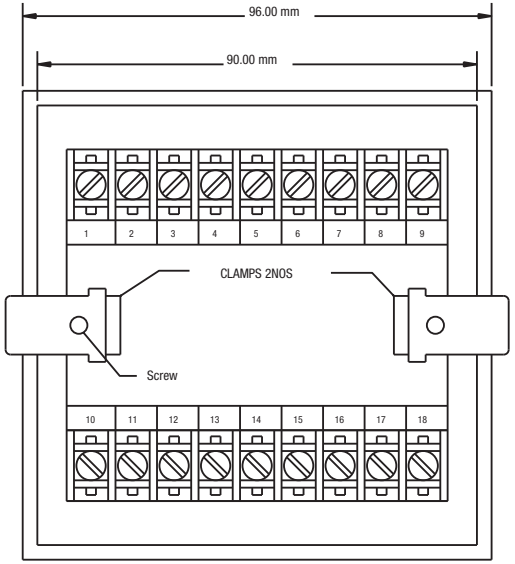


Fixing and dimensions :

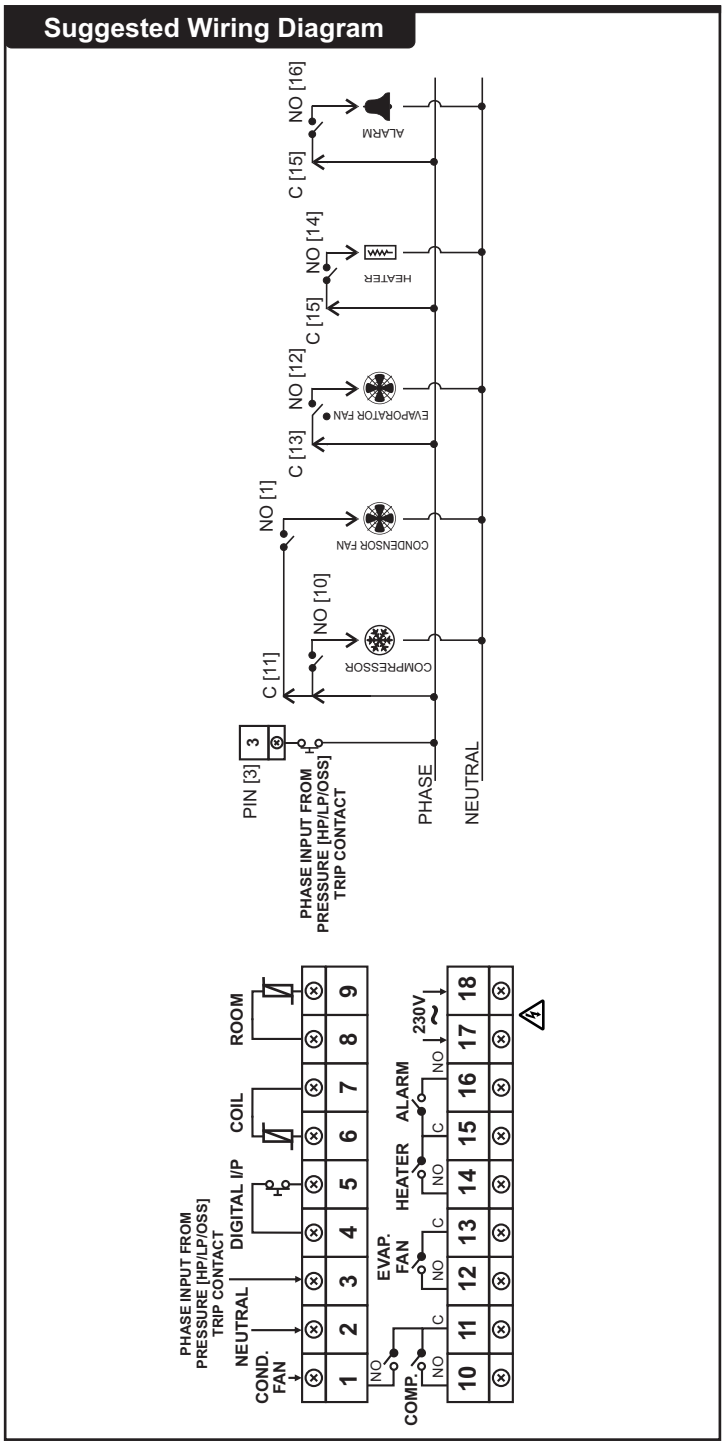
Installation :







Suggested Wiring Diagram



Controller : Controller should be installed in a place protected by vibration, water and corrosive gasses and where ambient temperature does not exceed the values specified in the technical data.

Probe : To give a correct reading, the probe must be installed in a place protected from thermal influences, which may affect the temperature to be controlled.

CAUTION

WIRING : The probe and its corresponding wires should never be installed in a conduit next to control or power supply lines.The electrical wiring should be done as shown in the diagram. The power supply circuit should be connected to a protection switch. The terminals admit wires of upto 2.5sq mm.

WARNING : Improper wiring may cause irreparable damage and personal injury. Kindly ensure that wiring is done by qualified personnel only.

Maintenance : Cleaning: Clean the surface of the controller with a soft moist cloth. Do not use abrasive detergents, petrol, alcohol or solvents.

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OUR OTHER PRODUCTS

sub-Zero®

INDIA

Cold Room Controller
Chiller Controller
Two Compressors Controller
Heating Controller
Humidity Controller
Pressure Controller

CASTLE™

Ball Valves
Globe Valves
Hand Valves
Flow Switches
Solenoid Valves